EDITORIAL

Riding the waves of change together: are we all paying attention?

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Galileo's (1564–1642) introduction of the experimental method and Newton's (1643–1727) further advancement in analytical thinking and scientific methodology created in the seventeenth and eighteenth centuries a fertile scientific environment for change [1–3]. As the community of science registered and embedded these new experimental methodologies, the world began to see them applied to the field of medicine. With Pierre Louis (1787–1872), recognized by many as the father of epidemiology, the field of medicine first adopted the methodology of tabulating data for purposes of observation and improvement in the health sciences [4, 5], processes further refined and applied by both Florence Nightingale (1820–1910) and Earnest A. Codman (1869–1940) [5–8].

Through his 1916 publication on hospital efficiency, Codman showed the need to collect and publish convincing data that can be used by others to improve patient outcomes [7–9]. As data collection and analysis proliferates, so does our understanding and knowledge of medicine. Medical principles known as ''the truth'' for centuries are now being challenged and constantly rethought. A famous quote by Sydney Burwell (1863–1967), medical educator of the twentieth century, perhaps best illustrates this constant pattern of change:

> My students are dismayed when I say to them, ''Half of what you are taught as medical students will in 10 years have been shown to be wrong. And the trouble is, none of your teachers know which half.'' [10]

As new scientific discoveries will further challenge current knowledge of medicine, no one is likely to feel at ease anytime soon while hearing the above-mentioned statement, as it still stands true today. Researchers and clinicians alike will continue to benefit in the pursuit of excellence in care from the continual strengthening of scientific methods and data collection. The unquestionable contributions of Archibald Cochrane and David Sackett [5, 11–13], with their development of evidence-based methodologies, have allowed for a new discourse for change and improvement.

The current complexity of health care, as evidenced by the explosion of medical knowledge, has called for a transition from an individual expert model to a model centered around principles of evidence-based medicine [14]. These concepts are endorsed by the Institute of Medicine in the 2001 publication, Crossing the Quality Chasm: A New Health System for the 21st Century.

> *Evidence-based decision making.* Patients should receive care based on the best available scientific knowledge. Care should not vary illogically from clinician to clinician or from place to place. [15]

As the only true constant in history is change, successful businesses have learned to accept it, and good visionary leaders are trained to identify revolutionary spikes along the waves of change that can act as potential ''killer apps,'' creating excitement and giving a competitive edge to their businesses. These changes are necessary for leaders to introduce innovative business practices with new models that can truly signal progress and provide the organization with a better return on investment. For a new innovation to be totally realized, however, key business elements must be aligned to justify and recognize its potential for revolutionary impact. For example, email had been around since the early 1970s [16], but it took two more decades for all the necessary elements of success to merge as the entrepreneurial community understood its unrealized business potential. This type of vigilance toward change anticipation is critical, as any missed opportunity could result in costly errors and delays and a lack of true progress for the enterprise.

Now the question for all in the health sciences is whether health care leaders are listening to the message communicated in the Quality Chasm report. Are they understanding and internalizing the lessons conveyed, or are they focusing too specifically on the current business challenges of health care without realizing the opportunities to bridge the ''chasm?'' Their buy-in will be key to implementing all the necessary steps required to continue on the road of change and advancement, as ultimately they will need to recognize that this is an essential element for success and survival.

Two fields that could undoubtedly aid and facilitate the execution of bridging the chasm are biomedical informatics and biomedical librarianship. In the past decades, as the need for cost containment became an essential element in health care, access to information and data analysis and manipulation resurfaced as tools for improved health care management. Both biomedical informatics and biomedical librarianship became essential elements in the quest for this transformation, as they demonstrated an adaptability of their workers to the problems at hand.

The most recent changes observed in the field of biomedical librarianship, for instance, can serve as a case for the study of transformation and quick adaptability. Medical librarianship has been able to cleverly channel the wave of change brought about by the information and technology industry to feed an information-hungry environment (health care) by masterfully aligning the elements of change, creating a value-added opportunity for the business, and totally revolutionizing the provision of information to deliver and package knowledge in an innovative way. At the base of this transformation was the realization by leadership that when information and knowledge flow can be captured,

properly filtered, and made accessible in a timely manner, it will become an indispensable driving force. Through a series of incremental steps, libraries have been able to replace an old infrastructure of thinking and reorganize their workflow to allow for this paradigm shift.

Vanderbilt University Medical Center (VUMC) set about radically redefining the way it practiced health care in the early 1990s, and central to this redefinition was implementing technology to inform and aid health care practice. Technology also allowed for the distribution of largely centralized functions like information or knowledge acquisition—formerly centered in a biomedical library—to health care providers themselves, directly in their workflow, to inform decisions and improve care at the time and place of need [17]. Web technology effectively served as a catalyst for a spike of innovation, allowing for a rethinking of work for information providers and new ways of working at VUMC.

Among the incremental steps crucial to effecting this change were finding leadership to fuel the vision and bring staff on board with change. Staff with the required skills and mindset to embrace an evolving organization can be difficult to locate or develop from the existing staff pool. Recognizing that augmented skill sets were needed to do the advanced work expected of staff, a formalized training program was developed and integrated into daily work [18, 19]. This advanced education, in combination with technology, allowed the library to move closer to functioning as a true knowledge-based organization versus a more traditional information management–focused organization.

In parallel with ramping up internal capacities, the medical center moved toward a system of goals-based management, in which each unit set annual goals encompassing critical initiatives for the organization and the unit. This process of annual goal setting across the institution helped the library to align its energies and foster collaboration, as well as make the medical center's direction clear for its employees.

Working toward explicit goals can help different units of an organization maintain an awareness of environmental factors—those catalyzing events that touch off radical change—that promise to inform the course of health care. Factors such as evidence-based medicine and the movement toward active patient participation in health care are among the recent trends that libraries have been able to anticipate and proactively move to address by developing new expertise. The implementation of these kinds of changes has allowed the library to position information as a central, shared resource and demonstrates how other information-intensive or information-driven businesses can adopt these underlying principles to optimize information flow.

As VUMC staff reflect on what we have accomplished and what still could be done, we realize how libraries' broad adaptation to change can serve as an example of clear visioning and adaptability. In a setting in which the spikes of innovation merge with smaller changes to fulfill a need, the combined effect can be an overall innovation that translates into a true business advantage.

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